

REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.					
1. REPORT DATE (DD-MM-YYYY) 04-05-2011		2. REPORT TYPE FINAL		3. DATES COVERED (From - To)	
4. TITLE AND SUBTITLE Access Denied: Future Military Operations in an Anti-Access Environment				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Maj Brendan P. Walsh Paper Advisor: Col Tim White				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Joint Military Operations Department Naval War College 686 Cushing Road Newport, RI 02841-1207				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Distribution Statement A: Approved for Public Release, Distribution is unlimited.					
13. SUPPLEMENTARY NOTES A paper submitted to the Naval War College faculty in partial satisfaction of the requirements of the Joint Military Operations Department. The contents of this paper reflect my own personal views and are not necessarily endorsed by the NWC or the Department of the Navy.					
14. ABSTRACT The development of Anti-Access/Area Denial (A2/AD) threats has the potential to impact the U.S. military's ability to project power throughout the world. A2/AD threats have the ability to impact military operations by affecting movements to a theater (anti-access) and affecting maneuver within a theater (area denial). This paper defines the categories of A2/AD threat (maritime, air, and denial-of-services) and provides operational examples for each of the categories such as submarines, long-range ballistic missiles, and cyber attacks. It explains a potential operational concept designed to overcome the A2/AD threat called AirSea Battle. The AirSea Battle concept emphasizes joint and multinational operations as a means to integrate the capabilities of the U.S. Navy, U.S. Air Force, and multinational partners to counter the growing A2/AD threat, specifically in response to China's increasing military potential. Finally, the paper addresses possible counterarguments and discusses recent Chinese weapon system developments to highlight the importance of the A2/AD threat on operational planning.					
15. SUBJECT TERMS Anti-Access, Area Denial					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES 20	19a. NAME OF RESPONSIBLE PERSON Chairman, JMO Department
a. REPORT UNCLASSIFIED	b. ABSTRACT UNCLASSIFIED	c. THIS PAGE UNCLASSIFIED			19b. TELEPHONE NUMBER (include area code) 401-841-3414

**NAVAL WAR COLLEGE
Newport, R.I.**

Access Denied: Future Military Operations in an Anti-Access Environment

by

Brendan P. Walsh

Major, USAF

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature: _____

4 May 2011

Contents

Introduction	1
Overview of Anti-Access/Area Denial Threats	3
An Operational Plan to Counter Anti-Access/Area Denial Strategy	7
Counter-Argument	10
Rebuttal	12
Recommendations	14
Conclusion	15
Bibliography	17

Abstract

Access Denied: Future Military Operations in an Anti-Access Environment

The development of Anti-Access/Area Denial (A2/AD) threats has the potential to impact the U.S. military's ability to project power throughout the world. A2/AD threats have the ability to impact military operations by affecting movements to a theater (anti-access) and affecting maneuver within a theater (area denial). This paper defines the categories of A2/AD threat (maritime, air, and denial-of-services) and provides operational examples for each of the categories such as submarines, long-range ballistic missiles, and cyber attacks. It explains a potential operational concept designed to overcome the A2/AD threat called AirSea Battle. The AirSea Battle concept emphasizes joint and multinational operations as a means to integrate the capabilities of the U.S. Navy, U.S. Air Force, and multinational partners to counter the growing A2/AD threat, specifically in response to China's increasing military potential. Finally, the paper addresses possible counterarguments and discusses recent Chinese weapon system developments to highlight the importance of the A2/AD threat on operational planning.

Potential adversaries are investing in weapons designed to neutralize U.S. advantages – to deny our military freedom of action while potentially threatening America’s primary means of projecting power: our bases, our sea and air assets, and the networks that support them.

Secretary of Defense Robert M. Gates

Introduction

The U.S. military possesses the ability to project power worldwide in support of national strategic interests; this capability has been unchallenged due to the lack of a credible threat since the fall of the Soviet Union at the end of the Cold War. Unfortunately, developments in anti-access/area denial weapon (A2/AD) systems will soon begin to challenge the U.S. military’s ability to project power in portions of the world vital to U.S. national interests, as comments by Secretary Gates and recent national strategic documents suggest. The National Military Strategy of 2011 states “Assured access to and freedom of maneuver within the global commons – shared areas of sea, air, and space – and globally connected domains such as cyberspace are being increasingly challenged by both state and non-state actors.”¹ The emerging anti-access environments will require Combatant Commanders to develop new operational concepts that increase their focus on joint and multinational operations to retain America’s military ability to project power and meet their joint operational necessity of operational access and global freedom of action.

The Western Pacific and the Persian Gulf are two regions where the military enjoyed unrestricted access in the past, but even these historically secure areas will be increasingly more dangerous in the future. Ongoing military efforts by China and Iran threaten the United States’ access to these regions, unless the military makes changes to its operational planning process incorporating the new reality of anti-access/area-denial. The rising A2/AD problem is not limited to just China and Iran; Hezbollah’s use of anti-ship missiles against Israel in

¹ *National Military Strategy 2011* (8 February 2011), http://www.jcs.mil/content/files/2011-02/020811084800_2011_NMS_-_08_FEB_2011.pdf, accessed 30 March 2011.

2006 is a prime example of a non-state actor forcing the United States to change its operational assumptions on where it can project power around the world.²

It is important to clearly define anti-access and area denial to ensure all of the facets of this strategy are properly explored. The terms anti-access and area denial are commonly used together to describe a strategy to impede an adversary's ability to operate within an area of interest. Major General David Scott, the Air Force's Director of Operational Capability Requirements, defines the term anti-access as "affecting movements to a theater and area-denial as affecting maneuver within a theater."³ Taken together, an adversary's A2/AD strategy can target the U.S. military's ability to deploy or operate freely in overseas theaters of operation. Anti-access operations can deter, slow, or prevent U.S. forces from entering a desired area of operation.

One impact of an emerging anti-access threat is the U.S. Navy's potential loss of sea control in the Western Pacific. Sea control (critical to the Navy's ability to project power) is defined as "complete and permanent control of the sea, ensuring the Navy's free use of sea communications while denying it to the enemy."⁴ Secretary Gates highlighted the importance of maintaining the U.S. ability to project power worldwide, "This country learned early on, after years of being bullied and blackmailed on the high seas, that it must be able to protect trade routes, project power, deter potential adversaries, and, if necessary, strike them

² DefenseTech.org, "Hezbollah's Surprise Weapons", <http://defensetech.org/2006/07/19/hezbollahs-surprise-weapons/> (accessed 26 April 2011).

³ Maj Gen David Scott, Director of Operational Capability Requirements, "Anti-Access/Area-Denial Challenges", Powerpoint, 6 October 2010, Fort Walton Beach, Florida: Air Armament Symposium.

⁴ Milan Vego, *Joint Operational Warfare Theory and Practice* (Newport, RI, U.S. Naval War College, 2009) II-47.

on the oceans, in their ports, or on their shores. We cannot allow these core capabilities and skill sets to atrophy through distraction or neglect.”⁵

The emerging A2/AD threat has the potential to significantly impact Air Force operations as well. The Air Force relies on forward basing to reduce the distance that its aircraft must fly to support global operations, including six major bases in the Western Pacific.⁶ The Chinese military currently has the technology to target U.S. bases in Japan and Korea and is developing weapons capable of reaching Andersen Air Force Base on Guam.⁷ Without assured access to regional bases, the challenge of establishing air superiority will be greatly increased. These Chinese capabilities must be mitigated or the Air Force’s ability to project power into the region may be severely limited.

Overview of Anti-Access/Area Denial Threats

A2/AD threats may be broken down into three categories: maritime (threats to surface combatants), air (including threats to aircraft and their bases of operation), and denial-of-services (threats to vulnerable command and control [C2] nodes).⁸ These threats are categorized by the military capability they target, rather than where the threat is based. For example, a land-based anti-ship ballistic missile targets naval surface combatants while ship-based missile defense systems target aircraft. This distinction is important to note because the Air Force and Navy will require greater integration to overcome anti-access threats as the U.S. Air Force may be required to target naval threats to enable U.S. Navy operations while

⁵ Robert M. Gates, Secretary of Defense (address, Navy League Sea-Air-Space Exposition, National Harbor Maryland, 3 May 2010).

⁶ Jeff Hagen, “Potential Effects of Chinese Aerospace Capabilities on U.S. Air Force Operations,” Testimony presented before the U.S.-China Economic and Security Review Commission on May 20, 2010, http://www.uscc.gov/hearings/2010hearings/transcripts/10_05_20_trans/hagen_testimony.pdf (accessed 1 May 2011).

⁷ Ibid.

⁸ The categories of threats were derived by the author based on experience analyzing Air Force and Navy capabilities with the Air Force Red Team.

the Air Force would require Navy support to overcome threats to their aircraft. Prior to examining how operations would be conducted against A2/AD systems, a deeper understanding of the nature of the threats is required.

The maritime A2/AD threats are designed to degrade or deny the ability of movement or maneuver for surface and subsurface vessels. China currently possesses two significant maritime A2/AD threats with the ability to target surface vessels, submarines and Anti-Ship Cruise Missiles (ASCMs). China has been rapidly expanding its submarine fleet since 1995, which currently consists of 54 attack submarines (compared to only 53 attack submarines in the U.S. Navy fleet).⁹ China is not the only country expanding its submarine fleet. Pakistan recently agreed to purchase six submarines from China that are considered advanced under-sea vessels.¹⁰ This purchase could have a negative impact on future U.S. naval operations in the Arabian Sea, in addition to the possible negative maritime impact in the Pacific. The Chinese ASCM capability is also a formidable capability. ASCMs can be employed from land batteries, ships, submarines, and fighter or bomber aircraft. The Chinese have equipped their submarines, as well as specially designed stealthy catamarans to employ ASCMs.¹¹ This flexibility makes defense against ASCMs more challenging while also increasing the range the missile can be employed against surface combatants.

⁹ Mackenzie Eaglen and Jon Rodeback, "Submarine Arms Race in the Pacific: The Chinese Challenge to U.S. Undersea Supremacy," The Heritage Foundation, <http://www.heritage.org/research/reports/2010/02/submarine-arms-race-in-the-pacific-the-chinese-challenge-to-us-undersea-supremacy> (accessed 27 April 2011).

¹⁰ Dominic Di Natale, "Pakistan Switches Sides, Expanding Arms Allegiance With China and Leaving U.S. Behind", FOX NEWS.com, <http://www.foxnews.com/world/2011/03/26/switching-sides-pakistan-expands-arms-allegiance-china/> (accessed 14 April 2011).

¹¹ Andrew Erickson, "Chinese Anti-Ship Cruise Missile Firing as Part of Combined Arms Anti-Carrier Exercises in East China Sea, 30 June-5 July," <http://www.andrewerickson.com/2010/07/combined-arms-anti-ship-exercise-in-east-china-sea-30-june-5-july/> (accessed 1 May 2011).

The development of the anti-ship ballistic missile (ASBM) may be the most important development in A2/AD operations as it represents the most significant change to surface warfare since the introduction of the aircraft carrier. The Chinese DF-21D ASBM, designed to target and strike aircraft carriers, provides a much greater range than any of the previous maritime threats. According to the Office of the Secretary of Defense's annual report to Congress on military and security developments in China, the Chinese are developing an anti-ship ballistic missile (ASBM) based on a variant of their current operational ballistic missiles that possess a range in excess of 1,500 km. Armed with a maneuverable warhead this ASBM is intended to provide the People's Liberation Army the capability to attack ships, including aircraft carriers, in the western Pacific Ocean.¹² Some analysts speculate if the DF-21D performs as advertised, it may effectively make U.S. Navy aircraft carriers obsolete in the event of a future direct conflict with China over Taiwan.¹³ The utility of the ASBM threat is not limited to just a direct conflict with China over Taiwan, it has the ability to impact carrier operations in the entire Western Pacific region.

The Air A2/AD threats are composed of both threats to aircraft within the range of enemy air defenses (area-denial) as well as threats to their bases of operation (anti-access). Dr. Aaron Friedberg, an international affairs expert from Princeton University, describes the vulnerabilities of the U.S. military's bases in the western Pacific: America's ability to project power in the western Pacific is "heavily dependent on access to a handful of local bases,

¹² Office of the Secretary of Defense, "ANNUAL REPORT TO CONGRESS, Military and Security Developments Involving the People's Republic of China 2010," http://www.defense.gov/pubs/pdfs/2010_CMPR_Final.pdf (accessed 28 March 2011).

¹³ David Crane, "Chinese DF-21D ASBM (Anti-Ship Ballistic Missile): Will it Obsolete U.S. Aircraft Carriers?," Defense Review, <http://www.defensereview.com/chinese-df-21d-asbm-anti-ship-ballistic-missile-will-it-obsolete-u-s-aircraft-carriers/> (accessed 23 February 2011).

most on foreign soil and all soon within range of highly accurate Chinese conventional missiles.”¹⁴

The threat to aircraft is not limited to ballistic missiles targeting airfields. The air threat also includes Integrated Air Defense Systems (IADS) designed to deny access to enemy airspace. The Chinese focused a large portion of their defense spending on creating a modern IADS along their coast, including Russian designed missile systems along the Taiwan Strait.¹⁵ Like other A2/AD threats, China is not the only country interested in upgrading their air defense network. Iran’s purchase of the NEBO SVU, described as the most advanced early warning radar ever produced, increases its ability to track and target adversaries over Iranian airspace.¹⁶

The Denial-of-Services A2/AD threats are a relatively new category of A2/AD threats (relative to maritime and air) designed to target the U.S. military’s reliance on space and cyber assets to enhance its C2 functions. Admiral Willard emphasized this threat during his 2011 testimony to the Senate Armed Services Committee, noting that China’s pursuit of counter-space and -cyber capabilities. These Chinese capabilities will not only disrupt U.S. military operations, but also threaten the space- and cyber-based information infrastructure that enables international communications and commerce.¹⁷ In January 2007, China successfully demonstrated their ability to target objects in space, launching an anti-satellite

¹⁴ Aaron L Friedberg and Robert S Ross, “Here Be Dragons: Is China a Military Threat?,” <http://www.gwu.edu/~power/literature/dbase/friedberg4.pdf> (accessed 7 March 2011).

¹⁵ ADM Robert F. Willard, Commander of U.S. Pacific Command. “STATEMENT OF ADMIRAL ROBERT F. WILLARD, U.S. NAVY COMMANDER U.S. PACIFIC COMMAND BEFORE THE SENATE ARMED SERVICES COMMITTEE ON U.S. PACIFIC COMMAND POSTURE”, 24 March 2010.

¹⁶ Carlo Kopp. “Reassessing Iran’s Air Defenses”, Air Power Australia, <http://www.airspacepower.net/APA-NOTAM-170710-1.html> (accessed 14 April 2011).

¹⁷ ADM Robert F. Willard, Commander of U.S. Pacific Command. “STATEMENT OF ADMIRAL ROBERT F. WILLARD, U.S. NAVY COMMANDER U.S. PACIFIC COMMAND BEFORE THE SENATE ARMED SERVICES COMMITTEE ON U.S. PACIFIC COMMAND POSTURE”, 12 April 2011.

(ASAT) missile that destroyed a Chinese weather satellite.¹⁸ The ability to target satellites would give China (or any other potential adversary) a capability to target not only U.S. communications, but Intelligence, Surveillance, and Reconnaissance (ISR) assets as well.

The vulnerability of cyberspace is another method of asymmetric warfare that adversaries will attempt to exploit in order to degrade U.S. operations. An official at the Naval Network Warfare Command noted that Chinese computer hackers will exploit “anything and everything.”¹⁹ Chinese hackers were responsible for an attack that shut down the Naval War College’s network in 2006, shutting down the school’s e-mail and computer systems for several weeks.²⁰ A successful attack on a Combatant Command’s computer network would severely limit their ability to conduct operations, especially in such a large geographic area as the Pacific.

An Operational Plan to Counter the Anti-Access/Area Denial Strategy

During the Cold War, the U.S. military was consumed with the challenge of developing a plan to protect against the threat of an invasion of Europe by the Soviet Union. The overwhelming force of the Soviet military, combined with the inability of the U.S. Army or Air Force to single-handedly repel an invasion, required the two services to develop a joint operational concept called AirLand Battle. This new concept required close coordination of

¹⁸ Aviation Week, “Chinese Test Anti-Satellite Weapon”, http://www.aviationweek.com/aw/generic/story_channel.jsp?channel=space&id=news/CHI01177.xml, (accessed 14 April 2011).

¹⁹ Josh Rogin. “Cyber Officials: Chinese hackers attack ‘anything and everything’”, Federal Computer Week, http://fcw.com/articles/2007/02/13/cyber-officials-chinese-hackers-attack-anything-and-everything.aspx?sc_lang=en, (14 April 2011).

²⁰ Ibid.

the two services to stop an attack using land forces and utilize the air forces to interdict reinforcements.²¹

The growing A2/AD threat led the U.S to create a concept similar to AirLand Battle. Because the primary forces required to counter this evolving threat are air and naval forces, this new operational concept is titled AirSea Battle. In September 2009, Chief of Naval Operations Admiral Gary Roughead and Air Force Chief of Staff Gen Norton Schwartz signed a classified Memorandum of Agreement to develop a concept that would combine the capabilities of each service and offset their vulnerabilities to deter and defeat future enemies.²² Secretary Gates called the agreement by the Navy and the Air Force to work together on the Air-Sea Battle concept an encouraging development.²³ While the AirSea Battle operational framework focuses on the Western Pacific region, defense analysts maintain the concept is not about fighting a war with China but maintaining the U.S. ability to maintain a presence, coalitions, and influence in the region.²⁴ Once the concept is fully developed, the lessons learned should be applied to A2/AD problems worldwide.

The AirSea Battle analysis predicts five critical competitions: battle network vs. counter-battle network, missile attack vs. missile defense, air superiority vs. air defense, sea and undersea control vs. sea and undersea denial, and force sustainment vs. counter-force

²¹ John L Romjue, "The Evolution of the AirLand Battle Concept", Air University Review May-June 1984, available at <http://www.airpower.maxwell.af.mil/airchronicles/aureview/1984/may-jun/romjue.html> (accessed 9 April 2011).

²² Christopher P Cavas, "USAF, U.S. Navy to Expand Cooperation", Defense News, <http://www.defensenews.com/story.php?i=4366295> (accessed 9 April 2011).

²³ Robert M. Gates, Secretary of Defense (address, Navy League Sea-Air-Space Exposition, National Harbor Maryland, 3 May 2010).

²⁴ Greg Grant, "CSBA AirSea Battle Concept: More Stealth, Long-Range Strike to Counter Chinese Battle Networks", Defense Tech. <http://defensetech.org/2010/05/18/csba-releases-its-airsea-battle-concept/> (accessed 9 April 2011).

sustainment.²⁵ By identifying the critical competitions, the services can focus their capabilities on defending against an adversary's desire to impact U.S. operations while preserving the flexibility to accomplish military objectives. For example, in the missile attack vs. missile defense competition, the Chinese would use their ballistic missiles to target American forward bases of operation (such as Kadena Air Base on Okinawa or Andersen Air Base on Guam). The Air Force and Navy could counter these attacks by dispersing their forces over an increased number of bases in the region, forcing the Chinese to attack targets over a much larger area, reducing their weapon effectiveness.²⁶ Other methods of countering a missile attack include hardening critical structures such as C2 facilities and aircraft hangars, as well as increasing "active" defensive measures such as electronic attack and air defense weapons.²⁷

Another important aspect of the AirSea Battle concept is the increased focus on joint operations, which would utilize capabilities of each service to achieve the operational objectives of overcoming A2/AD threats. For example, Air Force counter-space operations could target Chinese space-based surveillance systems that are critical to engaging aircraft carriers with anti-ship ballistic missiles.²⁸ Another example of joint operations is a recently executed demonstration of the Network Enabled Weapon architecture; an Air Force Joint Surveillance Radar Attack System (JSTARS) aircraft tracked moving ships that were then

²⁵ Center for Strategic and Budgetary Assessments, "AirSea Battle" Powerpoint, 18 May 2010, <http://www.csbaonline.org/publications/2010/05/airsea-battle-concept/> (accessed 26 March 2011).

²⁶ Richard Halloran, "AirSea Battle", Air Force Magazine.com, <http://www.airforce-magazine.com/MagazineArchive/Pages/2010/August%202010/0810battle.aspx> (accessed 9 April 2009).

²⁷ Ibid.

²⁸ Bill Sweetman and Richard D Fisher Jr., "AirSea Battle Concept is Focused on China", Aviation Week, http://www.aviationweek.com/aw/jsp_includes/articlePrint.jsp?headLine=AirSea%20Battle%20Concept%20Is%20Focused%20On%20China&storyID=news/awst/2011/04/04/AW_04_04_2011_p62-299099.xml (accessed 10 April 2011).

engaged by F/A-18 Hornet using an AGM-154C glide bombs.²⁹ These specific examples illustrate the synergy between the two services that a Combatant Commander must utilize to overcome increasingly challenging threats.

Similar to AirSea Battle's increased focus on joint operations, the concept also relies on increasing efforts to integrate the capabilities of regional allies to accomplish its objectives. For example, AirSea Battle is exploring greater integration with the Japanese Self-Defense Forces as a means of enhancing defense against ballistic missiles and potentially enhancing Japan's anti-submarine barriers.³⁰ Another potential mitigation to the A2/AD threat is dispersing aircraft over a larger number of airfields in the region to reduce the impacts of attacks on current forward operating bases. During a recent exercise in Indonesia, Air Force aircrews assessed the capabilities of airfields in Indonesia as potential options for use if its primary airfields are attacked.³¹

Counter-Argument

One may argue that concerns about the A2/AD threat are either exaggerated or unrealistic. Dr. Daniel Goure addresses those concerns in his article "The Overblown Anti-Access, Area Denial Threat", accuses those alarmed about the emerging threat of being "Cassandras" that are hyping today's threat and ignoring the history of the U.S. military's ability to successfully deter the Soviet Union during the Cold War, arguably a much larger and more capable threat.³² Another argument attempting to quell concerns about the severity of the A2/AD threat is the overwhelming power of American military forces compared to the

²⁹ Ibid.

³⁰ Richard Halloran, "AirSea Battle," Air Force Magazine.com, <http://www.airforce-magazine.com/MagazineArchive/Pages/2010/August%202010/0810battle.aspx> (accessed 1 May 2011).

³¹ Ibid.

³² Daniel Goure. "The Overblown Anti-Access, Area Denial Threat," Lexington Institute, <http://www.lexingtoninstitute.org/the-overblown-anti-access-area-denial-threat?a=1&c=1171> (accessed 23 February 2011).

rest of the world. The displacement of the U.S. Navy battle fleet exceeds at least the next thirteen largest navies combined, of which 11 are U.S. allies or partners.³³ The U.S. Air Force routinely operates its bomber force from forward operating bases worldwide and is the only air force with a stealth bomber fleet, capable of attacking targets worldwide without being detected while launching from bases in the Continental United States.

The mission of countering A2/AD threats is not new to the U.S. Navy. The Navy operates 57 nuclear-powered attack and cruise missile submarines, more than the rest of the world combined. These submarines are capable of conducting anti-submarine warfare against the less-capable submarines being fielded by potential adversaries, as well as launching precision-guided missile strikes against A2/AD systems.³⁴ The surface fleet also possesses a significant self-defense capability against airborne threats, such as aircraft or anti-ship cruise missiles. The seventy-nine Aegis cruisers are equipped with SM-2 Standard surface-to-air missiles as well as the Phalanx Close In Weapon System (CIWS).³⁵ The aircraft carrier also carries its own self defense systems, with the E-2C Hawkeye airborne early warning aircraft and F/A-18 Hornet multirole fighters capable of intercepting incoming threats.

The U.S. Air Force also possesses counters to anti-access/area-denial systems. Its forward operating bases are capable of being defended from attack by ground-to-air missile systems like the U.S. Army's MIM-104 Patriot.³⁶ Dedicated combat air patrols also provide a safeguard against aerial bombardment, while aircraft on the ground can be protected with

³³ Robert M. Gates, Secretary of Defense (address, Navy League Sea-Air-Space Exposition, National Harbor Maryland, 3 May 2010).

³⁴ U.S. Navy Fact File, "Fleet Ballistic Missile Submarines," http://www.navy.mil/navydata/fact_display.asp?cid=4200&tid=800&ct=4 (accessed 26 April 2011).

³⁵ U.S. Navy Fact File, "Cruisers," http://www.navy.mil/navydata/fact_display.asp?cid=4200&tid=800&ct=4 (accessed 26 April 2011).

³⁶ Army-Technology.com, "Patriot Air Missile Defense System," <http://www.army-technology.com/projects/patriot/> (accessed 26 April 2011).

hardened aircraft shelters. Aircraft operating in an area-denial environment have countermeasures available to them, including electronic warfare and Suppression of Air Defense (SEAD) weapons to target radars of an IADS.³⁷ Long-range precision weapons add to the protection of U.S. assets, by reducing the need to operate in high-threat areas. Finally, the employment of stealth aircraft allows commanders to attack heavily defended targets with a much lower risk than conventional aircraft. For example, the F-117 Nighthawk flew only two percent of the sorties in Operation Desert Storm but destroyed forty percent of the most heavily defended targets without a single aircraft lost.³⁸

The final counterargument against the ability of A2/AD weapons to force the U.S. military to modify its operations is the technical maturity of the weapons systems, specifically the ASBM. China is currently the only country pursuing an ASBM capability, and the DF-21D has yet to be fully tested. Andrew Erickson, a professor at the Naval War College, lists five challenges that the Chinese must overcome to complete a kill-chain against an aircraft carrier: 1) detection, 2) tracking, 3) penetration of target defenses, 4) hitting a moving target, and 5) causing sufficient damage.³⁹ If any part of the kill-chain is broken, the attack would be unsuccessful. This reliance on a complex kill-chain gives the U.S. multiple potential targets to render the entire ASBM system ineffective.

³⁷ AF.mil, "AGM-88 HARM," <http://www.af.mil/information/factsheets/factsheet.asp?id=75> (accessed 26 April 2011).

³⁸ Marc Phillippe Babineau, "Modern air warfare and the impact of stealth aircraft," Helium: Military Aircraft, <http://www.helium.com/items/1038707-modern-air-warfare-and-the-impact-of-stealth-aircraft> (accessed 1 May 2011).

³⁹ Andrew Erickson, "Chinese ASBM Development: Knowns and Unknowns", The Jamestown Foundation, http://www.jamestown.org/programs/chinabrief/single/?tx_ttnews%5Btt_news%5D=35171&tx_ttnews%5BbackPid%5D=25&cHash=31ceb95794 (accessed 29 March 2011).

Rebuttal

Because of its potential to radically alter the United States' ability to project power, military leaders may want to believe the challenges of creating a successful ASBM system are too complex to overcome. Unfortunately, widespread evidence exists in open sources that the Chinese have placed a high priority on this capability and may be very close to having an operational system. The major event signifying the Chinese reached a new level of sophistication in their military programs was their successful ASAT demonstration in January 2007. The kill vehicle for the ASAT demonstration was a variant of the DF-21; the ASBM is also based on this missile. During a discussion with Japanese media in August 2010 Admiral Robert Willard, commander of U.S. Pacific Command, discussed the maturity of the ASBM system, "To our knowledge, it has undergone repeated tests and it is probably very close to being operational."⁴⁰ A month later, China conducted a long-range missile flight test; the results and purpose of the test have been kept classified by the Chinese government. Some analysts believe that the secrecy is the result of an unsuccessful test, while others argue, "the test showed some new military capability of China's growing missile forces that the government does not want to advertise, notably the high-technology anti-ship ballistic missile, based on a modified DF-21 medium-range missile."⁴¹

The final argument that U.S. commanders must consider when assessing the capability of these anti-access weapons during the operational planning process is that the United States does not have an accurate understanding of the performance of its own

⁴⁰ Yoichi Kato Asahi Shimbun, "China's anti-ship missile is nearly operational", Asahi.com, <http://www.asahi.com/english/TKY201008250379.html> (accessed 30 March 2011).

⁴¹ Bill Gertz, "Inside the Ring: China Missile Test," Washington Times, <http://www.washingtontimes.com/news/2010/oct/6/inside-the-ring-488593726/?page=1> (accessed on 30 March 2011).

defensive systems in operational conditions. Ideally, the U.S. military would possess an adversary's threat hardware to test against, or a reasonable model to verify the effectiveness of their systems. Without any A2/AD systems to accurately test against, the risk of conducting operations in such an unknown environment is greatly increased.

A tactical example can prove useful in understanding the danger of assuming performance of a weapon system without testing in a relevant environment. The AIM-9 infrared (IR) missile program is an example of taking a weapon system into combat that has not been adequately tested under operational conditions.⁴² The British successfully employed the AIM-9L against the Argentines in the Falklands-Malvinas conflict, destroying 19 Argentine aircraft with 26 shots (the probability-of-kill [Pk] was 0.73). The overwhelming success of the AIM-9 in the Falklands-Malvinas conflict motivated adversaries to develop flares to counter the IR missiles. The countermeasures proved effective; performance of the AIM-9M (a newer version of the missile) was greatly degraded in Operation Desert Storm, with only 11 kills in 48 shots (0.23 Pk). This example of the AIM-9 successes and failures highlights the risks of relying too heavily on U.S. countermeasures as a means of operational protection against threat systems.

Recommendations

The ideas outlined in AirSea Battle concept represent a shift in operational planning for the military services. Instead of each service analyzing its capabilities to determine what each "brings to the fight" to accomplish their assigned tasks of an operation, the A2/AD threat will require commanders to focus their planning on how one service's unique capabilities enable other service's tasks of an operation to be accomplished. The current

⁴² All AIM-9 data from: John Stillion and Scott Perdue. "Air Combat Past, Present and Future," RAND Project Air Force, http://www.defenseindustrydaily.com/files/2008_RAND_Pacific_View_Air_Combat_Briefing.pdf (accessed 23 February 2011).

planning process emphasizes joint operations, but future operational success will require an even more seamless integration. Commanders can instill this focus by including joint forces in operational exercises to the maximum extent possible. Similarly, training and exercise events should also strive to include multinational partners. Finally, the nature of the A2/AD threat dictates that commanders must be prepared to accept greater risk in operational planning.

Conclusion

For one to win one hundred victories in one hundred battles is not the acme of skill. To subdue the enemy without fighting is the acme of skill.

Sun Tzu

One of the most important reasons why military leaders continue to study the writings of Chinese military theorist Sun Tzu is because his theories on warfare remain valid in today's operational environment. Sun Tzu's tenet of "subduing the enemy without fighting" highlights the importance of deterrence as part of national military strategy. For the past decade the U.S. military's efforts have focused on defeating the two insurgencies in Iraq and Afghanistan. These two conflicts are being fought in a relatively permissive environment (neither country possessed any significant A2/AD capability). While the 2010 Quadrennial Defense Review Report focused on prevailing in today's wars, the report also calls for working to prevent future conflict⁴³. The military must ensure it has developed the operational plans necessary to overcome potential A2/AD threats in order to provide an effective deterrence to a future conflict.

Secretary Gates travelled to China in January to meet with his counterparts in the Chinese military with the goal of improving military-to-military relations, "aimed at

⁴³ Department of Defense, "2010 Quadrennial Defense Review Report," http://www.defense.gov/qdr/images/ODR_as_of_12Feb10_1000.pdf (accessed 2 May 2011).

improving our mutual understanding and reducing the risk of miscalculation.”⁴⁴ Secretary Gates’ hope is that improved relations will avoid an expensive arms race between China and the U.S., similar to the arms race between the U.S. and the Soviet Union during the Cold War. Unfortunately, China’s increased investment and fielding of A2/AD weapon systems does not afford the U.S. military the luxury of relying on diplomacy to be an effective deterrent against China’s policies that will impact the U.S. military’s ability to project power. The Chinese military continues to get stronger at a time while the American military is facing budget pressures from the strain of the U.S. economy.⁴⁵

Despite the Chinese defense expenditures of the past two decades, some assert China does not pose a threat to America’s vital national security interests. Dr. Robert Ross from the Security Studies program at the Massachusetts Institute of Technology asserts that “Despite China’s military advances, it has not developed the necessary technologies to constitute a grave threat...the United States can be confident in its ability to retain maritime dominance well into the twenty-first century.”⁴⁶ This attitude of overconfidence is a dangerous position for military commanders to assume. The U.S. dominance in the air, space, and maritime domains was built over decades with investments in superior capability, an increased focus on joint operations, and efforts to foster cooperation with American allies. The ideas outlined in the developing AirSea Battle operational concept are the latest evolution of how the military conducts operations that will ensure that the U.S. retains its ability to project power worldwide.

⁴⁴ Robert Haddick, “This Week at War: Gates’s China Syndrome,” Foreign Policy, http://www.foreignpolicy.com/articles/2011/01/07/this_week_at_war_gates_china_syndrome (accessed 16 April 2011).

⁴⁵ Ibid.

⁴⁶ Aaron L Friedberg and Robert S Ross, “Here Be Dragons: Is China a Military Threat?,” <http://www.gwu.edu/~power/literature/dbase/friedberg4.pdf> (accessed 7 March 2011).

BIBLIOGRAPHY

- AF.mil. "AGM-88 HARM." <http://www.af.mil/information/factsheets/factsheet.asp?id=75> (accessed 26 April 2011).
- Army-Technology.com. "Patriot Air Missile Defense System." <http://www.army-technology.com/projects/patriot/> (accessed 26 April 2011).
- Aviation Week. "Chinese Test Anti-Satellite Weapon", http://www.aviationweek.com/aw/generic/story_channel.jsp?channel=space&id=news/CHI01177.xml, (accessed at 14 April 2011).
- Babineau, Marc Phillippe. "Modern air warfare and the impact of stealth aircraft." Helium: Military Aircraft. <http://www.helium.com/items/1038707-modern-air-warfare-and-the-impact-of-stealth-aircraft> (accessed 1 May 2011).
- Cavas, Christopher P. "USAF, U.S. Navy to Expand Cooperation", Defense News. <http://www.defensenews.com/story.php?i=4366295> (accessed 9 April 2011).
- Chase, Michael S. "Not in Our Backyard: China's Emerging Anti-Access Strategy", http://www.progressivefix.com/wp-content/uploads/2010/10/2010_CHASE-China-Not-in-our-backyard.pdf (accessed 20 March 2011).
- Crane, David. "Chinese DF-21D ASBM (Anti-Ship Ballistic Missile): Will it Obsolete U.S. Aircraft Carriers?" Defense Review. <http://www.defensereview.com/chinese-df-21d-asbm-anti-ship-ballistic-missile-will-it-obsolete-u-s-aircraft-carriers/>, (accessed 23 February 2011).
- Center for Strategic and Budgetary Assessments. "AirSea Battle." Powerpoint, 18 May 2010, <http://www.csbaonline.org/publications/2010/05/airsea-battle-concept/> (accessed 26 March 2011).
- DefenseTech.org. "Hezbollah's Surprise Weapons." <http://defensetech.org/2006/07/19/hezbollahs-surprise-weapons/> (accessed 26 April 2011).
- Department of Defense. "2010 Quadrennial Defense Review Report." http://www.defense.gov/qdr/images/QDR_as_of_12Feb10_1000.pdf (accessed 2 May 2011).
- Di Natale, Dominic. "Pakistan Switches Sides, Expanding Arms Allegiance With China and Leaving U.S. Behind", FOX NEWS.com. <http://www.foxnews.com/world/2011/03/26/switching-sides-pakistan-expands-arms-allegiance-china/> (accessed 14 April 2011).

- Eaglen, Mackenzie and Rodeback, Jon. "Submarine Arms Race in the Pacific: The Chinese Challenge to U.S. Undersea Supremacy." The Heritage Foundation.
<http://www.heritage.org/research/reports/2010/02/submarine-arms-race-in-the-pacific-the-chinese-challenge-to-us-undersea-supremacy> (accessed 27 April 2011).
- Erickson, Andrew. "Chinese ASBM Development: Knowns and Unknowns." The Jamestown Foundation.
http://www.jamestown.org/programs/chinabrief/single/?tx_ttnews%5Btt_news%5D=35171&tx_ttnews%5BbackPid%5D=25&cHash=31ceb95794 (accessed 29 March 2011).
- Erickson, Andrew. "Chinese Anti-Ship Cruise Missile Firing as Part of Combined Arms Anti-Carrier Exercises in East China Sea, 30 June-5 July."
<http://www.andrewerickson.com/2010/07/combined-arms-anti-ship-exercise-in-east-china-sea-30-june-5-july/> (accessed 1 May 2011).
- Friedberg, Aaron L. and Ross, Robert S. "Here Be Dragons: Is China a Military Threat?"
<http://www.gwu.edu/~power/literature/dbase/friedberg4.pdf> (accessed 7 March 2011).
- Gates, Robert M., Secretary of Defense. Address. Navy League Sea-Air-Space Exposition, National Harbor Maryland, 3 May 2010, available at:
<http://www.defense.gov/speeches/speech.aspx?speechid=1460> (accessed 23 February 2011).
- Gertz, Bill. "Inside the Ring: China Missile Test." Washington Times.
<http://www.washingtontimes.com/news/2010/oct/6/inside-the-ring-488593726/?page=1> (accessed on 30 March 2011).
- Goure, Daniel. "The Overblown Anti-Access, Area Denial Threat." Lexington Institute.
<http://www.lexingtoninstitute.org/the-overblown-anti-access-area-denial-threat?a=1&c=1171> (accessed 23 February 2011).
- Haddick, Robert. "This Week at War: Gates's China Syndrome." Foreign Policy.
http://www.foreignpolicy.com/articles/2011/01/07/this_week_at_war_gates_china_syndrome (accessed 16 April 2011).
- Hagen, Jeff. "Potential Effects of Chinese Aerospace Capabilities on U.S. Air Force Operations." Testimony presented before the U.S.-China Economic and Security Review Commission on May 20, 2010.
http://www.uscc.gov/hearings/2010hearings/transcripts/10_05_20_trans/hagen_testimony.pdf (accessed 1 May 2011).
- Halloran, Richard. "AirSea Battle.", Air Force Magazine.com. <http://www.airforce-magazine.com/MagazineArchive/Pages/2010/August%202010/0810battle.aspx> (accessed 9 April 2009).

- Kopp, Carlo. "Reassessing Iran's Air Defenses", Air Power Australia, <http://www.ausairpower.net/APA-NOTAM-170710-1.html> (accessed 14 April 2011).
- National Military Strategy 2011 (8 February 2011), http://www.jcs.mil//content/files/2011-02/020811084800_2011_NMS_-_08_FEB_2011.pdf, accessed 30 March 2011.
- National Research Council. *Oceanography and Mine Warfare*. Washington, DC: National Academy Press, 2000. 12.
- Office of the Secretary of Defense. ANNUAL REPORT TO CONGRESS, Military and Security Developments Involving the People's Republic of China 2010. http://www.defense.gov/pubs/pdfs/2010_CMPR_Final.pdf (accessed 28 March 2011).
- Rogin, Josh, "Cyber Officials: Chinese hackers attack 'anything and everything'", Federal Computer Week, http://fcw.com/articles/2007/02/13/cyber-officials-chinese-hackers-attack-anything-and-everything.aspx?sc_lang=en, (14 April 2011).
- Scott, David. "Anti-Access/Area-Denial Challenges" Powerpoint. 6 October 2010. http://www.ndiagulfcoast.com/events/archive/36th_symposium/Day2/02_AIE_AirArmanentSym.pdf, accessed 23 February 2011.
- Romjue, John L., "The Evolution of the AirLand Battle Concept", Air University Review May-June 1984, <http://www.airpower.maxwell.af.mil/airchronicles/aureview/1984/may-jun/romjue.html> (accessed 9 April 2011).
- Shimbun, Yoichi Kato Asahi. "China's anti-ship missile is nearly operational." Asahi.com. <http://www.asahi.com/english/TKY201008250379.html> (accessed 30 March 2011).
- Stillion, John and Perdue, Scott. "Air Combat Past, Present and Future." RAND Project Air Force. http://www.defenseindustrydaily.com/files/2008_RAND_Pacific_View_Air_Combat_Briefing.pdf (accessed 23 February 2011).
- Sweetman, Bill and Fisher Jr., Richard D. "AirSea Battle Concept is Focused on China." Aviation Week. http://www.aviationweek.com/aw/jsp_includes/articlePrint.jsp?headLine=AirSea%20Battle%20Concept%20Is%20Focused%20On%20China&storyID=news/awst/2011/04/04/AW_04_04_2011_p62-299099.xml (accessed 10 April 2011).
- U.S. Navy Fact File. "Cruisers." http://www.navy.mil/navydata/fact_display.asp?cid=4200&tid=800&ct=4 (accessed 26 April 2011).

U.S. Navy Fact File. "Fleet Ballistic Missile Submarines."
http://www.navy.mil/navydata/fact_display.asp?cid=4200&tid=800&ct=4 (accessed 26 April 2011).

Vego, Milan. *Joint Operational Warfare Theory and Practice*. Newport, RI, U.S. Naval War College, 2009.

Willard Robert F., Commander of U.S. Pacific Command. "STATEMENT OF ADMIRAL ROBERT F. WILLARD, U.S. NAVY COMMANDER U.S. PACIFIC COMMAND BEFORE THE SENATE ARMED SERVICES COMMITTEE ON U.S. PACIFIC COMMAND POSTURE", dated 12 April 2011.

Willard Robert F., Commander of U.S. Pacific Command. "STATEMENT OF ADMIRAL ROBERT F. WILLARD, U.S. NAVY COMMANDER U.S. PACIFIC COMMAND BEFORE THE SENATE ARMED SERVICES COMMITTEE ON U.S. PACIFIC COMMAND POSTURE", dated 24 March 2010.